3.2 Medical Requirements Overview

TABLE 3.2: MEDICAL REQUIREMENTS OVERVIEW

MRID# and Title:	MR036L Toxicological Assessment Using Grab Sample Container
Sponsor:	Medical Operations
Discipline:	Environmental Health
Category:	Medical Requirements
References:	ISS Medical Operations Requirements Document SSP 50260; SSP 41172, Qualification and Acceptance Environmental Testing Requirements, Section 5
Purpose/Objectives:	Preflight module/visiting vehicle off gas testing assesses the projected accumulation of volatile organic contaminants in the module or visiting vehicle between closeout and crew entry on orbit. Determine and assess crew exposure to volatile organic contaminants in the ISS atmosphere, based on analysis of archive samples collected in Grab Sample Containers (GSCs).
Measurement Parameters:	Concentrations of airborne volatile organic compounds detected in the samples.
Deliverables:	Pre-flight off gas report evaluating the concentration of volatile organic compounds and their rate of accumulation based on analysis of samples collected in evacuated containers. Post-flight report evaluating the concentrations of volatile organic compounds detected based on analysis of archive samples collected in GSC.
Flight Duration:	$\geq$ 30 days
Number of Flights:	Every ISS Increment
Number and Type of Crew Members Required:	One crewmember (CM) is trained in all Environmental Health System (EHS) activities (US Specialist). All CMs are trained in EHS Toxicology Operations. One CM will perform the in-flight activity.
Other Flight Characteristics:	N/A

3.3 Preflight Training

TABLE 3.3: PREFLIGHT TRAINING

Preflight Training Activity Description:	All crewmembers are trained in Environmental Health System (EHS) Toxicology Operations.			
	Duration:	**Schedule:**	**Flexibility:**	**Personnel Required:**
Schedule:	EHS Assessment: 90 minutes	See MA/ITP Schedule	N/A	Instructors /Crewmembers
Ground Support Requirements Hardware/Software	**Preflight Hardware:**	**Preflight Software:**	**Test Location:**	
	Grab Sample Containers	N/A	U.S.	
Training Facilities	**Minimum Room Dimensions:**	**Number of Electrical Outlets:**	**Temperature Requirements:**	**Special Lighting:**
	29' x 14'	None	Ambient	N/A
	Hot or Cold Running Water:	**Privacy Requirements:**	**Other:**	
	N/A	Private room free from any distractions.	1 table, 6-8 chairs	
Constraints/Special Requirements:	None			
Launch Delay Requirements:	Refresher training is conducted at crew member request.			
Notes:	EHS Assessment includes training for GSCs, Formaldehyde Monitor Kit (FMK), Compound Specific Analyzer – Combustion Products (CSA-CP), Portable Oxygen Monitor (POM), Carbon Dioxide Monitor Kit (CDMK), Portable Gas Delivery System, and Air Quality Monitor (AQM) USOS and Russian Crewmembers who have completed ASCAN Training or have flown before will complete the EHS Assessment.			

3.4 Preflight Activities

TABLE 3.4: PREFLIGHT ACTIVITIES

Preflight Activity Description:	Pre-flight monitoring of new modules and visiting vehicles: Once the module or visiting vehicle is at a predetermined level of configuration, it will be sealed and air samples will be collected from the interior of the module or vehicle after a pre-determined period. The duration of ground-based testing is determined by the estimated length of time that the module or vehicle will be sealed prior to crew entry in space. Details and requirements for the off gas testing are contained in SSP 41172, Qualification and Acceptance Environmental Testing Requirements, Section 5. JSC personnel in coordination with module/visiting vehicle representatives and the MMOP Air Quality Subgroup will determine the test parameters and other detailed logistics.				
Schedule:	**Activity:**	**Duration:**	**Schedule:**	**Flexibility:**	**Personnel Required:**
	Module/Vehicle Off-Gas Test	5 minutes/sample	Sampling performed when module reaches predetermined level of configuration.	N/A	One representative from JSC Toxicology and Environmental Chemistry (TEC) Laboratory
Ground Support Requirements Hardware/Software	**Preflight Hardware:**	**Preflight Software:**	**Test Location:**		
	Evacuated Containers	N/A	U.S.		
Testing Facilities	**Minimum Room Dimensions:**	**Number of Electrical Outlets:**	**Temperature Requirements:**	**Special Lighting:**	
	N/A	N/A	N/A	N/A	
	Hot or Cold Running Water:	**Privacy Requirements:**	**Vibration/Acoustic Isolation:**	**Other:**	
	N/A	N/A	N/A	The JSC TEC Laboratory is required to provide evacuated canisters for sample collection and analyze samples.	
Constraints/Special Requirements:	Detailed logistics (quantity & frequency of sampling) will be determined by JSC personnel in coordination with module/visiting vehicle representatives and the MMOP Air Quality Sub-group.				
Launch Delay Requirements:	First entry procedures should be reviewed and updated, if necessary, to account for the additional time that the module/vehicle will be sealed prior to crew entry.				
Notes:	None				
Data Delivery	A preliminary report will be provided to the module/vehicle supplier and NASA Operational teams as soon as they are available so that the information can be used to develop operational pre-flight and/or in-flight mitigation strategies. The TEC Laboratory will distribute the final report from the off-gas test to the MMOP Air Quality subgroup members and will post the report on the JSC TEC website where it will be available to all stakeholders.				

3.5 In-Flight Activities

TABLE 3.5.1: IN-FLIGHT ACTIVITIES

In-Flight Activity Description:	GSC Nominal Sampling: GSCs are unstowed and samples are collected centrally along the mid-axis of the module being sampled unless otherwise noted in the activity Execute Notes. After sample collection, the date, time, and sampling location are recorded on the label of each GSC. One GSC is used for each location to be sampled.		
Schedule:	**Duration:**	**Schedule:**	**Personnel Required:**
	Unstow and Stow: 5 minutes Sample Collection: 5 minutes/sample	- Once every 45 days in each major module (Lab and alternating between Columbus, Service Module, and JPM). - At First Ingress into each new module or non-Russian visiting vehicles.	1 Crewmember
Procedures:	Procedures are contained within the System Operation Data File (SODF) Med Ops book The label on the GSC also lists the stepwise procedures for operation as a reference.		
Constraints / Special Requirements:	• GSC collections should be taken centrally located along the mid-axis of the module. • The container should be held away from the body during sample collection. • GSC sampling should be coordinated with the AQM Auto Run Start, FMK sampling, and Russian AK-1M sampling (if on the same day). GSC sampling can occur any time during the 48 hours FMK deploy period. • Additional GSC samples may be collected in response to complaints regarding air quality or in contingency situations; when air quality is a concern or as requested by Crew Surgeon.		
Photo / TV Requirements:	• Photo documentation might be requested during contingency situations on an as needed basis. • Photo of activity should be at a distance to give reasonable perspective of sampling area. • Images are downlinked to and can be retrieved from the Digital Imagery Management System (DIMS).		
Cold Stowage Requirements:	N/A		
Mission Extension Requirements:	N/A		
Landing Wave-Off Requirements:	N/A		
Data Delivery:	See Table 3.6 Post-flight Activities for GSC data delivery		

TABLE 3.5.2: IN-FLIGHT HARDWARE

Hardware/Software Name
Grab Sample Container (GSC)

3.6 Postflight Activities

TABLE 3.6: POSTFLIGHT ACTIVITIES

Postflight Activity Description:	The GSC samples collected in-flight will be analyzed by the JSC TEC Laboratory.			
	Duration:	**Schedule:**	**Flexibility:**	**Personnel Required:**
Schedule:	N/A	N/A	N/A	N/A
Ground Support Requirements Hardware/Software	**Postflight Hardware:**	**Postflight Software:**	**Test Location:**	
	N/A	N/A	N/A	
Testing Facilities	**Minimum Room Dimensions:**	**Number of Electrical Outlets:**	**Temperature Requirements:**	**Special Lighting:**
	N/A	N/A	N/A	
	Hot or Cold Running Water:	**Privacy Requirements:**	**Vibration/Acoustic Isolation:**	**Other:**
	N/A	N/A	N/A	N/A
Constraints/Special Requirements:	• Stowage temperatures during transport of the return samples to the TEC Laboratory should be within the range of -58 °F (-50 °C) to 122 °F (50 °C). • GSC's should be transported in return packaging to prevent damage during transport.			
Early Destow / Early Return:	*The GSC samples collected during nominal and contingency operations on ISS are not on the early destow list. These samples will be processed as normal destow and return unless otherwise noted on the manifest request.			
Notes:	SF, SD, OC, or MTLO is responsible for the return of samples to JSC depending on the return vehicle.			
Data Delivery	**Data/Report to Designated Recipients (Nominal/Contingency):**		**Mission Summary Report:**	**Data Archives:**
	• If the analysis of GSCs indicates an elevation or trend, then JSC Toxicology will notify the Contingency Action Team, which includes the ISS Increment Lead Crew Surgeon • A preliminary report will be provided within 1 week of receipt for samples collected during a contingency event (including, but not limited to, crew symptoms) • Analytical results from analysis of routine samples will be available within 33 days of sample receipt. • A final Increment Toxicology report will be posted to the JSC Toxicology Website no later than 3 months after analysis of all Increment samples is completed.		A final Increment Toxicology report will be posted to the JSC Toxicology Website no later than 3 months after analysis of all Increment samples is completed.	Contact JSC Toxicology Group.

3.7 Summary Schedule

TABLE 3.7: SUMMARY SCHEDULE

ACTIVITY	DURATION	SCHEDULE	PERSONNEL REQUIRED	CONSTRAINTS
Preflight Training				
EHS Assessment	90 minutes	See MA/ITP Schedule	Instructors/Crew members	None
Preflight Activity				
Module/Visiting Vehicle Off-gas Test:	5 minutes/sample	Sampling performed when module reaches predetermined level of configuration	One representative from the JSC TEC Laboratory	Detailed logistics (quantity & frequency of sampling) will be determined by JSC personnel in coordination with module/visiting vehicle representatives and the MMOP Air Quality Subgroup
In-Flight Activity				
GSC Nominal Sampling	Unstow and Stow: 5 minutes Sample Collection: 5 minutes/sample	Once every 45 days in LAB, and alternating between Columbus, Service Module, & JPM. At first ingress into new module or non-Russian visiting vehicle.	1 Crewmember	• GSC collections should be taken centrally located along the mid-axis of the module. • The container should be held away from the body during sample collection. • GSC sampling should be coordinated with FMK sampling and Russian AK-1M sampling, if on same day. GSC sampling can occur anytime during 48 hour FMK deployment period. • Additional GSC samples may be collected in response to complaints regarding air quality or in contingency situations. • An AQM – Auto Run Start should be initiated by MCC-H within +/- 2 hours of nominal GSC collection, and 30 minutes prior to hatch opening for First Ingress sampling of new modules and non-Russian visiting vehicles.
Postflight: N/A				
Postflight Debrief:				
Debrief	No extra time	~R+30 days	Crew members/ Toxicology Team	Included as part of the Med Ops overall debrief.